

Research Article

Epidemiology of carbon monoxide gas poisoning deaths in Ardabil city, 2008-13

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ABSTRACT

Background: Carbon monoxide gas is odorless, colorless and toxic which are the most abundant pollutants in the lower atmosphere. Carbon monoxide poisoning is considered as one of the most common causes of mortality in Iran and Ardabil province. This study aimed to investigate the epidemiology of carbon monoxide gas poisoning died patients during 2008 to 2013.

Methods: In this descriptive cross-sectional study, with referral to the Ardabil coroner center and poisoning ward of Imam Khomeini hospital, the statistics related to carbon monoxide poisoning died patients have been extracted and entered into the Checklists then analyzed by statistical methods in SPSS.19.

Results: The number of deceased in this study was 35 people with a mean age of 33.66 ± 21.38 . Of them, 19 (54.3%) were male and 16 (45.7%) were female. 85.7 percent of the deceased had been poisoned at home which from them 71.4% died before transaction to hospital. The season winter with 48.6% include the most of cases and the most common vehicle of intoxication was water heater with 48.6%.

Conclusion: Carbon monoxide gas poisoning is one of the cases that causes to death of people in Ardabil every year and so promoting public awareness about risks due to Carbon monoxide could have a considerable role in the prevention of poisoning.

Keywords: Carbon monoxide, Intoxication, Epidemiology

INTRODUCTION

Carbon monoxide (CO) is a colorless, odorless and poisonous gas that burns carbon or carbon materials with low oxygen levels caused by the incomplete combustion.¹

Breathing the gas, causing CNS dysfunction and suffocation due to irreversible combination with hemoglobin in blood.²

In homes that use gas appliances, the peak concentration of carbon monoxide has been measured 100-53 ppm.³ In homes with defective ignition devices, and rooms with low air conditioning and in the kitchen, sometimes temporarily, even the peak concentration of carbon monoxide goes even further 53-100 ppm.⁴

May be carbon monoxide gas not considered by the time symptoms of severe poisoning in environment and facing the treatment with problem.⁴

Symptoms of acute poisoning are headache, dizziness, nausea, vomiting and abdominal pain and possibly anesthesia, convulsions and coma. Other symptoms of toxicity include muscle stiffness, increased respiratory rate, reduction blood pressure and sometimes pupillary constriction. Severe poisoning with this gas, it can be fatal, and no change has occurred in the RR associated with nausea and headache.⁵⁻⁸ whenever about 70% to 80% carbon monoxide combines with hemoglobin in the body, death occurs. Long-term chronic exposure to carbon monoxide, even at doses less than lethal dose values can also cause brain damage and mental changes & sometimes create a situation similar to Parkinsonism.⁹ In a study in American, the rate of non-fatal poisoning in infants lower than 4 years was 8.2/100000.⁸ According to higher cases of poisoning with CO in Iran and Ardabil, the aim of this study was investigate epidemiology of the carbon monoxide toxicity in Ardabil city.

METHODS

This was a descriptive cross sectional study has been done on Carbon monoxide poisoning can lead to death cases in 2008-2012. Necessary data such as age, sex, type bite (Heater, water heater etc.), location of the bite (Bedroom, bathroom etc.), time of poisoning, symptoms collected from Imam Khomeini hospital and forensic center records. Data analyzed by statistical methods in SPSS.19. The significant level was set at $P < 0.05$.

RESULTS

The mean age of Deceased was 33.7 ± 21.4 and 17 cases (48.6%) were in age group 20-40 years. From all poisoning cases 19 (54.3%) were male, 10 (28.6%) were self-employed & 19 (45.3%) were from urban (Table 1).

Table 1: Demographic variables in study population.

| Variables | n | % |
|------------------------|----|------|
| Sex | | |
| Male | 19 | 54.3 |
| Female | 16 | 45.7 |
| Occupation | | |
| Self-employee | 10 | 28.6 |
| Employee | 25 | 71.4 |
| Location | | |
| Urban | 19 | 45.7 |
| Rural | 16 | 54.3 |
| Education | | |
| University | 16 | 45.7 |
| Lower degree | 19 | 54.3 |
| Poisoning place | | |
| Home | 30 | 85.7 |
| Office | 5 | 14.3 |
| Marital status | | |
| Single | 14 | 40 |
| Married | 21 | 60 |

Results showed that 25 (71.4%) of cases died in home and rest of them died after transfer to hospital. 16 (45.7%) died in less than 24 hours of exposure (Figure 1).

48.6% of cases have been dying in winter season. Results showed that water heater with 48.6% were the most common tools of poisoning (Figure 2).

25 (65.8%) of cases have obesity, 11.4% have history of diseases and 8.6% have history of addiction. No intentional poisoning being reported among poisoned cases.

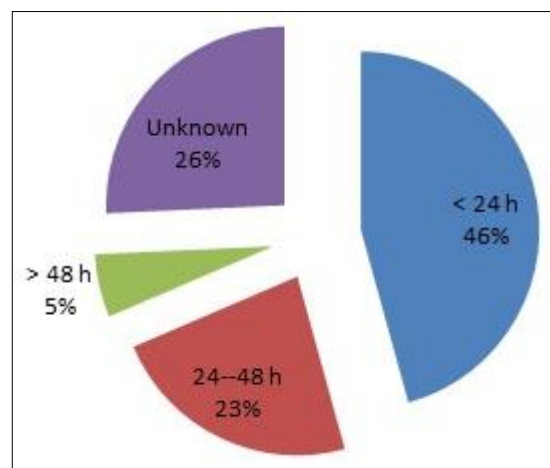


Figure 1: Time of exposure to die in poisoned cases.

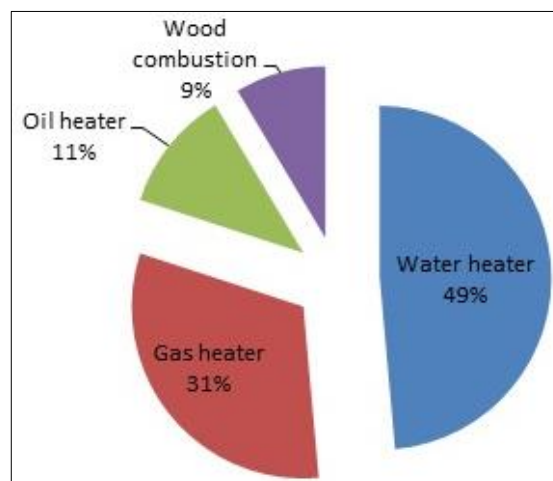


Figure 2: Causes of poisoning in died cases.

DISCUSSION

The mean age of descends in this study was 33.7 ± 21.4 that most of them were in age group 20-40 and this result was different with other studies in other places because most of studies reported that death has been occurred in agent groups.¹¹⁻¹⁴

For example, in Lutterloh et al. study most of patients were in age group 45-64 and in Harduar and Watkins and

et al. study the most of cases were in age groups 45-54 years.^{15,16} But in a study similar to our study in Tehran the most of death were in age groups 20-30 and in another study has been done by Shokrzadeh and et al., the mean age of death cases was 29.8 which were similar to our study.^{17,18}

Higher incidence of death from carbon monoxide poisoning in young age groups related to factors such as population structure, social, cultural and economical condition of country.

In this study the rate of death from MO poisoning in male with 54.3% was higher than female which similar to other studies.^{11,15-19}

The higher incidence of poisoning in male can be related to more job involvement of them. In this study the rate of death from MO poisoning in self-employee cases with 28.6% was higher than others which were similar to other studies.^{11,17,20}

In our study water heater and gas heater with 48.6% and 31.4% is the most common cause of poisoning which was similar to other studies.¹⁵⁻²² In Crowley and et al. study, many poisonings occur in the home due to fire but in our study no report due to fire.²³

The high level of deaths caused by water heater and heater can be due to uncertainty about the correct use of the equipment and or its non-normative installation. In this study 85.7% of died cases died in home and 14.3% in office. From all cases died in home, 46.7% poisoned in bathroom. Most deaths occur in the home, bathroom, living room, and parking can be associated with the fact that these places are mostly free of proper ventilation. In similar to other studies, in this study the prevalence of MO poisoning in the second half years was more than first half year but the different is not significant which be related to Ardabil cold climate.

CONCLUSION

Results of this study showed that poisoning with MO is one of the reasons for die in this province which was due to non-awareness about the correct use of the equipment and or its non-normative installation. So, note to the standardization of heating equipment, and to promote public awareness through the mass media and the educational environment against the dangers of exposure to carbon monoxide could be an important contribution to overcoming the problem of public health and prevention of this type of poisoning.

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Ethical approval: The study was approved by the institutional ethics committee

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